

# Digital Libraries

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## Abstract

*The field of education, including higher education, is passing through dramatic changes in the wake of introduction and popularization of concepts like global networking, paperless society, digital and virtual library and universal communication and database systems. Information Technology (IT) has changed the shape of today's libraries in a big way responding to new social and economic demands. The impact of IT has led to a paperless society, digital libraries and virtual libraries. With the availability of computers capable of computing at very high speed and having large disc storage space, it is possible to digitize and store information in the form of high quality graphics, colour images, voice signals and video clips at a relatively affordable cost. Today, Internet has become a most efficient channel for dissemination of information, having clickable access through web browsers to the vast amount of multimedia information stored on millions of web servers across the country.*

## 1. Introduction

Many advanced countries have taken steps to develop nationwide information (NII). The infrastructure would consist of networks, people, products and services. In not very distant a future, the world will be a single market place and single source of information. Institutions that seemed very stable and unchanging only a few decades ago, with clearly defined responsibilities and agendas, are being transformed today accommodating the demands of educated men and women in a great variety of ways and seeking to serve democratic institutions in ways that would not have been thought necessary in a pre-twentieth-century world. In this way, the nature of the library itself is changing from analog to digital form and all types of information can be made available in digital form, be it video, sound, or any other form.

## 2. Objectives

In order to have a good digital library system in our country, we need

- i) to study and understand the transformation which are now taking place in the technology field
- ii) co-operation and coordination among all segments of information sector (workers, information generators, processors, distributors, Government and users)
- iii) to establish a universal database for quick and qualitative information services in a variety of ways that suit the needs of different types of users through market orientation
- iv) to provide linkages between business and industry
- v) to develop mechanisms for sharing of information at local, regional, national and international level
- vi) to develop a network of borderless libraries and
- vii) to implement comprehensive and cohesive information technology

## 3. What is a Digital Library?

An automated library is not necessarily a digital library, since a library consisting of printed books and journals may be very highly automated. This automation alone does not make it digital. However, it is true that a digital library must be automated in some of its essential functions. So, we are to consider two possibilities :

- i) library that contains material in digitized form and
- ii) library that contains digital material

In a digital library, the delivery of the material can be very different from removing of a book from shelf and checking out. This is possible because the book in the digitized format can be copied to user's computer for reading, but still remains in the master computer. It can again be loaned in the name of another user. Computer readability is an important criterion in categorizing material as digital. The unit of a digital library is a digital

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object which may be textual, audio, video, images, numeric, computer programs or composites of such components.

#### **4. Need for Digital Library**

The information explosion is not confined to any particular subject of Science and Technology but is also taking place in Social Sciences and Humanities. With libraries facing manpower constraints, it is impossible to acquire every publisher's document under one roof and thus evolved the concept of resource sharing and networking. The emergence of telecommunication technology, computer and consumer electronics and their applications in the field of library network has proliferated online search services and resource sharing of database access. Since information can be digitized, the participant libraries are coming together to convert their holdings to electronic form and then putting them on network. The technologies for electronic transfer of information, electronic publishing, electronic storage, processing and delivery of information, including text and images are all feasible and operational. Since there is a demand for information with a facility for searching tailor made information at faster speed, the ability to store digitized print documents and to send them wherever they are needed is of great significance. For this will create unprecedented kinds of access to all published information anywhere in the world. Time and distance have created inequalities in access to printed publications, particularly time-sensitive scientific information, making the digitized library important economically and educationally to countries remote from the centres of research. Australia has built a national digital network to provide access to library resources from around the world to every remote village, and Singapore's national information policy is designed to create a new strategic port on the information trade routes of Asia.

#### **5. Technical Issues**

A digital library needs to maintain a powerful and user friendly resource information system. The library resource information may be made available from a well designed web page, loaded on a high-speed server with high bandwidth network interface for fast access and linking. The other issues are open communication protocol (client server protocol),

metadatabases (databases that describe and provide links to other databases/information sources), scanning and conversion technology.

The library database needs to be built on integrated good RDBMS (Remote Data Based Management Systems) with web enabled front-end. This will facilitate the development of web page based database access and query processing, provision of e-mail services, access to servers and remote databases and well trained manpower.

Further, it has to provide facility to generate book requisitions, sanctions and order forms, automatic accounting etc. These processing works and handling information are to be carried out with the ultimate goal of reaching the stage of paperless processing and ordering. Paperless working can be implemented easily once the vendor and users maintain internet access. Database management system has the relevant required features and there should be hierarchical authority and permission capability. This requires proven information technology system application including multi-media integration, electronic publishing tools, data compression, digital storage advanced retrieval, indexing, routing and filtering, privacy, authentication and security, location independent naming of digital sources, etc.

#### **6. Phases of Digitization Process**

The first major process is to digitize the entire physical medium and the library digitization project may start with the following phases :

- i) setting objectives or, clarifying purposes
- ii) selecting materials
  - a. whether the document is in the public domain or has any copyright restrictions
  - b. physical form of the material to be digitized
- iii) digitization assessment and benchmarking
- iv) use of Optical Character Recognition (O.C.R.) software to convert the captured digital images to text content
- v) implementing the project
  - a. preparation of materials
  - b. actual image capture
  - c. file management

#### vi) preserving the digitized documents

A pictorial presentation of the stages involves in the process of digitization can be seen below :

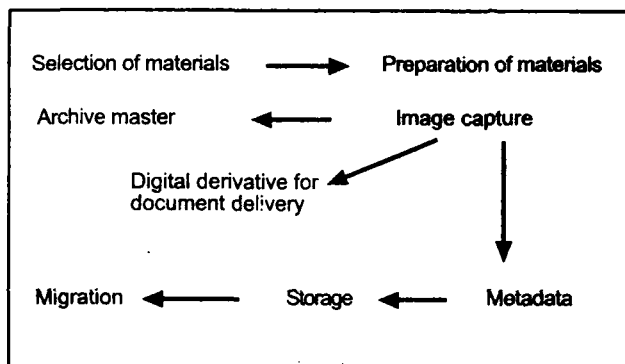


Fig. 1 : Key stages in the digitization chain

### 7. Methodology

The creation of digital information from conventional stage generally is a two stage process. The first stage is digitization. This is essentially the conversion of physical medium (printed books/journals) into a digital representation. The second stage of the computerization process is to use the computer for extracting information from the digitized image by using OCR software. This stage allows the information from the original book or document to be made available to the computer. Thus it becomes possible to index the text for retrieval and to reformat the text for different forms of output such as compressing, changing the font size, or such other graphical manipulation. Libraries of many educational institutions have their own resources like Ph.D theses, dissertations, project works for which the copyright exists with the institute or organization. Considering the increasing popularity of the network browsing of documents, it is desirable that copyright owned documents are taken in electronic form which may be made available on the internet. Now-a-days very high capacity hard disc drives are available from several companies like Seagate, Compaq etc. which can be thought of as a master system and can effectively replace CD-ROM serving jukeboxes.

### 8. Key Features

An indicative list of important features, not intended to be an exhaustive list, that a digital library is expected to support is as follows :

- ★ access to very large information collection
- ★ multimedia content
- ★ network accessibility

- ★ access to primary information, not merely surrogates or indexes
- ★ user friendly interface
- ★ link representation to hypertext
- ★ client server architecture
- ★ advanced search, retrieval, collection, development, preservation, publishing, annotation and integration of new information

### 9. Advantages

The major advantages of digital libraries are mentioned below :

- 1 universal accessibility
- 2 Quick retrieval of information and time-saving
- 3 Protecting rare books that are rapidly deteriorating due to over-use and poor storage condition
- 4 High speed communication and internetworking
- 5 Facility for downloading and printing
- 6 Increasing scope for information marketing
- 7 Saving cost, manpower and space
- 8 Scope for knowledge augmentation
- 9 Decision support mechanism
- 10 Increasing resource sharing opportunities and
- 11 A tool for preservation of heritage

### 10. System and Data Security

Security is a very important issue for library servers. This is important from the points of view of both providing protection for the documents as well as to save the servers from infecting the client system due to experimenting and hacking. Special care has to be taken especially for those which hold the book database and circulation information. Further, protection can be provided by physically separating the private and public networks and by using two identical systems on each of the networks with disc shadowing between the two systems. While the database system on the private networks holds the actual database, its shadowed replica makes the mirrored data available on the public network for viewing and browsing by the users. Both the systems can be interconnected through separate Ethernet Ports while another set of Ports can be used for connection to the private and public network connections. Each of the systems needs to be equipped with fire-walls and anti-virus software and the system needs to have packet sniffing, source

address logging as well as packet scanning operations. The other issues which should be dealt with before the implementation of digital libraries are information protection, intellectual property rights, privacy, sociability in cyberspace, government information policy, relevance of information available in digital libraries as well as its value.

#### **11. Present Scenario and the Role of A Librarian**

India has made tremendous progress in the field of Information Technology. With the development of IT, libraries have evolved to become information provider rather than mere documents provider. Many foreign publishing companies viz. IEEE, Elsevier Sciences have already made the past and current journals and conference proceedings online. The future libraries are going to be virtual libraries housing only servers which provide links to the publisher's servers for browsing purposes by the users. The individual libraries need to buy access licenses from the publishers and to make the links to these servers available from the local library web page. Today, many libraries world over therefore subscribe both hard copies as well as online access. In case of books, though many publishers are preparing electronic versions of the present and past books and many authors are coming forward to develop web based courseware and e-books. The printed version of books apparently is going to continue to have existence. The subscription to e-book browsing is on the rise because of its quick accessibility and advantage through online. The Library of Congress, the Bibliotheque Nationale de France, the British Library, the Central Library of Hyderabad (India) and many others have plans for digitizing large number of titles from their national and international literature and making these available through networks. Many of the electronic journals and newsletters are available on the computer networks. Some of these are available on various Gophers, Bulletin Boards, and anonymous FTP sites. <PACS Review> <PACS News> and <Current Cites> are three examples of this phenomenon. The first two are published from Houston and the third from Berkeley in the U.S.A.

Digital libraries have human resource requirements that are only now beginning to become clear. Although

librarians have traditionally engaged themselves in the organisation and arrangement of information collections, digital collections and services call for librarians to function as knowledge navigators or, as some have suggested, as cyberspace organizers. The nature of digital information resources also requires digital librarians to be resource integrators and to offer users customized consultation and interpretation services. The new digital information environment requires that librarians add value to the use of information. Librarians working in digital information structures are creators of information through assembly, organisation and generation of new knowledge. The authentication and validation of knowledge resources presents new opportunities to the postmodern librarian.

#### **12. Conclusion**

The digitized information library can organize printed works into a universal library and provide access to it from anywhere in the world, But in most likely cases, it will be printed out again and read on paper. As important as access to printed information this new kind of access to information remains a theoretical possibility as long as the computer networks or workstations that are needed to read from the digitized library are not universally available. Nor is there evidence that the digitized library is cheaper, given the cost of technology and the necessity to invest continuously in new technology. The digitized library has raised new problems for copyright enforcement since much of this republication in a new form is unauthorized or raises new kinds of copyright questions that have not yet been answered. Finally, paper is a far more durable medium for preservation of knowledge than computer. These are not unsolvable problems but the suggestion is that even the most elementary kind of digital library will require more than an evolutionary change.

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*Without books, history is silent, literature dumb, science crippled, thought and speculation at a stand still.*

— Barbara. W. Tuchman